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BOVINE MASTITIS RESEMBLING TUBERCULOSIS CAUSED BY *MYCOBACTERIUM LACTICOLA* AND OTHER RAPIDLY GROWING ACID-FAST BACTERIA

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INTRODUCTION

Towards the end of 1950 a case of bovine mastitis was found which resembled tuberculosis, clinically, microscopically and histologically, and from which *Mycobacterium lacticola* and no *Mycobacterium tuberculosis* was isolated. These findings led to the field and laboratory investigations described in this article.

FIELD INVESTIGATIONS

CASE NO. 1

In an attested herd attention was drawn to a cow with mastitis, in the milk of which acid-fast bacilli were found microscopically. The history was that soon after calving the cow had been treated with udder infusions of penicillin and of diamino-diphenyl sulphone in oily bases. The udder had become progressively indurated and, when the above sample was taken, gave the clinical picture of a tuberculous mastitis, but a biological test on the milk was negative for tuberculosis. The cow was slaughtered one month after the mastitis developed and a *post-mortem* examination was carried out.

At the *post-mortem* examination the affected quarter was noticeably abnormal, having a brown mottled appearance resembling that of early tuberculosis. No lesions were found in the supramammary lymph node. *M. lacticola* was isolated from the tissue of the affected quarter. Biological tests on this material were negative for tuberculosis.

CASE NO. 2

On the same farm four months later a second cow developed a mastitis and this also was treated with penicillin and with sulphone in oily suspensions. Again the quarter became progressively indurated and acid-fast bacilli were demonstrated in films of milk sediment. The cow was purchased by the laboratory and during the following month *M. lacticola* and *Str. uberis* were cultured several times from milk samples of the affected quarter. Biological tests on the milk samples were negative for tuberculosis but the swelling and induration continued to increase during this period.

At *post-mortem* examination the lesions in the affected quarter were similar to those in Case 1. No lesions were found in the supramammary lymph nodes or in any other lymph node or organ. *M. lacticola* was cultured from the quarter and biological tests were negative for tuberculosis.

CASE NO. 3

One week after the second case a third cow in the same herd developed an acute mastitis. This had been treated in the same way as the previous cases and a progressive induration followed, which lasted through the late stages of the lactation, through the dry period, and for the four months of the following lactation in which observations were carried out. The degree of swelling of the quarter fluctuated a little but at the end of the period of observation both the swelling and the induration were very marked. *M. lacticola* was cultured from the milk at intervals during these months. Biological examinations were again negative for tuberculosis.

M. lacticola could not be recovered in culture from quarter milk samples from any of the other cows in the herd.

CASE NO. 4

One month after Case No. 3 was discovered a milk sample from a cow in a different attested herd was received at the laboratory. This cow had the same type of mastitis and the same treatment history as described above. A different rapidly growing acid-fast bacillus was cultured from this sample. The induration of the udder was also marked and progressive, and the organisms were demonstrated microscopically and by culture during an observation period of more than four months. Repeated biological tests in guinea-pigs and rabbits were negative for tuberculosis.

CASE NO. 5

Two months later a portion of udder was received from a cow in a third attested herd. The macroscopic appearance of the udder tissue was similar to that of Cases No. 1 and No. 2. The history was again that of a tuberculosis-like mastitis following treatment of an acute mastitis with therapeutic agents in an oily base. Yet a third variety of rapidly growing acid-fast bacillus was isolated from the udder tissue while biological tests were negative for tuberculosis.

All five cows were subjected to the single intradermal comparative tuberculin test and none of them reacted to either the avian or the mammalian tuberculin.

LABORATORY FINDINGS

BIOLOGICAL TESTS ON MILK AND UDDER TISSUES

A total of 34 guinea-pigs, five rabbits and two chickens were inoculated with milk samples or affected tissue from the first three cases. The routes of inoculation were subcutaneous for guinea-pigs and intravenous for rabbits and chickens. Suspensions of the local lymph nodes from 12 inoculated guinea-pigs were injected into four further guinea-pigs six weeks after the original inoculation.

Four guinea-pigs and one rabbit were inoculated from the fourth case and two guinea-pigs from the fifth case.

These laboratory animals were killed at periods varying from four weeks to four months from the date of inoculation and no evidence of tuberculosis was found in any of them. The acid-fast organisms concerned could be cultured from the local lymph glands of guinea-pigs killed at four weeks, but not at six weeks, after inoculation. Some guinea-pigs tested three weeks after inoculation gave a slight reaction to both avian and mammalian tuberculins but the majority gave no reaction.

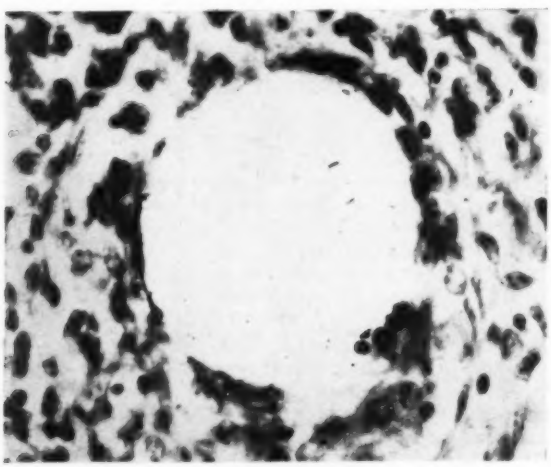
Histological Examination of the Udder Tissue

Case No. 1.—The distribution of the lesions was intralobular. The lesions were granulomata and in this case were about 0·3 mm. in diameter. They were circular and consisted of an outer layer of young fibrous tissue enclosing an area of histiocytes, lymphocytes, plasma cells, polymorphonuclear leucocytes and giant cells. In the centre of some of the lesions clearly defined circular spaces of about 90 microns diameter were seen. (See photograph 1.) These spaces had no lining membrane but polymorphonuclear leucocytes were sometimes seen surrounding them. The remaining affected tissue around the granulomata consisted of a cellular infiltration which was mainly of a lymphocytic nature.

The distribution of the bacilli as seen in sections was of particular interest. Very few bacilli were present in the cellular infiltration, by far the greatest concentration being in the circular spaces already described. Sometimes the bacilli were scattered throughout the spaces but in most cases they were arranged around the periphery. (See photograph 2.)

Photograph I.

Magnification × 200. Staining-Haematoxylin and Eosin. Granuloma showing thin fibrous capsule, giant cells and central vacuole.



Photograph II.

Magnification × 600. Staining-Ziehl-Neelsen. Vacuole showing a few isolated bacilli and a mass of bacilli on the left perimeter.

Case No. 2.—The picture was similar to that in the first case but the lesions were larger and the fibrous reaction was more marked. The circular spaces were again present and often had rings of leucocytes and lymphocytes around them. The bacilli were present in these spaces and a few were seen in the surrounding cellular " rings."

Case No. 3 and Case No. 4.—These two cows have not been slaughtered.

Case No. 5.—The histo-pathology was the same as for Case No. 2. The spaces containing the bacilli were seen in this case also.

Morphology of the Organisms in Milk and Affected Udder Tissue

Microscopically these acid-fast bacilli were indistinguishable from *M. tuberculosis* in some fields of films from milk sediment and smears from udder tissue. In other fields they were slightly stouter and sometimes their sides were less parallel than are those of the tubercle bacillus. The bacilli in *Case No. 4* were generally longer and finer than *M. lacticola* and had a more beaded appearance.

In sections of lesions from *Cases 1, 2 and 5* stained by the Ziehl-Neelsen method many of the bacilli were decolourised. They were best observed in Gram-stained sections in which they were strongly Gram positive. In films of milk sediment and udder tissue the bacilli were not decolourised by 3 per cent. acid-alcohol solution.

Endothelioid cells, occasionally in groups, were seen in films of milk sediments.

Cultural Examinations

The udder tissue of Case 1 was treated with 5 per cent. oxalic acid for 30 minutes before sowing on Dorset's egg slopes, but it was found in later cases that the oxalic acid treatment killed most, and sometimes all, of the organisms present. Most subsequent isolations were carried out on blood agar or Lowenstein-Jensen medium without prior treatment with oxalic acid.

The same organism was recovered from *Cases 1, 2 and 3* and was identified as *M. lacticola.* The organisms from *Cases 4 and 5* differed from *M. lacticola*, and from each other, in some of their cultural characteristics and biochemical reactions.

Characteristics of the Acid-fast Organisms from Cases 1, 2 and 3 (*M. lacticola*)

In young cultures the bacilli were 0·5 by 2 to 6 microns. They were Gram positive and acid-fast with occasional beading. There was no evidence of branching, spore formation or motility. In older cultures they became coccobacillary and lost much of their acid-fastness.

Growth occurred throughout the range tested, namely, 20° to 47° C., but the organisms failed to survive a temperature of 60° C. for one hour. Aerobic conditions were necessary for growth.

Growth occurred on ordinary media and was enhanced by the addition of glycerol. Colonies were visible after 24 hours' incubation at 37° C. These were at first convex, moist and pale. Later, they became rougher and faintly yellow. Pigmentation was best obtained on potato and glycerin egg slopes ; it was a faint yellow at first and gradually deepened to a deep orange after two months, by which time the growth was raised and wrinkled.

In Long's medium (Long, 1926) growth was sparse or absent but an abundant growth was obtained in this medium with the addition of 5 per cent. glycerol; it commenced as a pellicle which sank to the bottom of the flask after one week.

Merril's medium (Merril, 1931), with 2 per cent. agar added (Gordon, 1937), was used for fermentation tests. See Tables I and II for the results of these and other biochemical reactions.

Biochemical Reactions

Table I

Carbohydrate	Case 1		Case 2		Case 3		Case 4		Case 5	
	G	R	G	R	G	R	G	R	G	R
Adonite ...	+	+	+	+	+	+	—	—	—	—
Arabinose ...	+	+	+	+	+	+	±	—	—	—
Dextrin ...	—	—	±	—	±	±	—	—	—	—
Dulcite ...	+	+	+	+	±	+	—	—	—	—
Galactose ...	+	+	+	+	+	+	±	—	±	—
Glucose ...	+	+	+	+	+	+	+	—	+	+
Glycerol ...	+	+	+	+	+	+	+	+	±	—
Inosite ...	+	+	+	+	+	+	—	—	—	—
Inulin ...	—	—	—	—	—	—	—	—	—	—
Lactose ...	—	—	—	—	—	—	±	—	—	—
Levulose ...	+	+	+	+	+	+	+	—	+	+
Maltose ...	—	—	—	—	—	—	±	—	—	—
Mannite ...	+	+	+	+	+	+	±	—	—	—
Raffinose ...	—	—	—	—	—	—	±	—	—	—
Rhamnose ...	+	+	+	+	+	+	—	—	—	—
Salicine ...	—	—	—	—	—	—	±	—	—	—
Sorbite ...	+	+	+	+	+	+	+	—	±	—
Trehalose ...	+	+	+	+	+	+	+	—	—	—
Xylose ...	+	+	+	+	+	+	—	—	—	—
Saccharose ...	—	—	—	—	—	—	—	—	—	—
Mannose ...	+	+	+	+	+	+	+	±	+	+

G = Growth. R = Reaction.
The tests were read after two weeks' incubation.

Table II

	Case 1	Case 2	Case 3	Case 4	Case 5
Litmus milk	Alk	Alk	Alk	Alk	Alk
Production of H_2S	—	—	—	—	—
" Indol.	—	—	—	—	—
" Ammonia... ...	+	+	+	±	+
" Nitrites	+	+	±	—	—
Methyl Red test	—	—	—	—	—
Voges-Proskauer test	—	—	—	—	—
Utilisation of citrate	—	—	—	—	—
Liquefaction of gelatin	—	—	—	—	—

Alk = Alkaline.

The Acid-fast Organism from Case 4

In young cultures the bacillus was slightly longer and finer than *M. lacticola*. It was Gram positive, strongly acid-fast and showed definite beading. There was no evidence of mycelium formation, spore formation or motility. Aerobic conditions were necessary for growth which took place at 20° and 37° C., but not at 47° C. The bacillus failed to survive a temperature of 60° C. for one hour.

Colonies were visible after 48 to 72 hours' incubation at 37° C. They were at first dry, flat, rough and spreading, later becoming warty and wrinkled. Pigmentation was yellow and was more pronounced on media containing glycerol.

In Long's medium growth was very sparse but an abundant pellicle was obtained in this medium with the addition of 5 per cent. glycerol.

The results of the fermentation and biochemical tests are given in Tables I and II.

The Acid-fast Organism from Case 5

This organism was shorter than the other two and many cocco-bacillary forms were present even in young cultures. It was Gram positive and strongly acid-fast without any beaded appearance. There was no evidence of branching, spore formation or motility.

Aerobic conditions were necessary for growth, which was profuse at 20° C. and at 37° C. but absent at 47° C. The organism failed to survive a temperature of 60° C. for one hour.

On the common solid media, colonies were visible after incubation for 24 to 48 hours at 37° C. and were similar to those of *M. lacticola*. Yellow pigmentation was pronounced and the growth at three to seven days appeared like oil paint.

Growth in all liquid media, including Long's, was feeble and occurred as a granular deposit. The addition of 5 per cent. glycerol did not enhance the growth.

The results of fermentation and biochemical tests are given in Tables I and II.

Experimental Infection of Bovine Udders

Two organisms were used for these tests, namely, the *M. lacticola* from Case No. 2 and the acid-fast bacillus from Case No. 4. Cultures were grown on egg slopes for one week and suspensions were made in saline or arachis oil.

Infusion with Saline Suspensions

The udders of three cows were infused in each quarter with 1 c.c. of a saline suspension of *M. lacticola*. One of these cows was giving 2 gallons of milk daily and the other two were dry. The organisms were recovered from the lactating quarters for two to three weeks only, but from two out of six non-lactating quarters they were recovered for as long as six months. None of these quarters became swollen or indurated.

The animals were slaughtered four to six months after infusion and no macroscopic or histological abnormality was observed.

One quarter of a fourth cow which was giving 2½ gallons of milk daily was infused with a saline suspension of the acid-fast bacillus from Case No. 4. No clinical change took place in the quarter but the organisms were cultured from the milk for the following three weeks. The animal was then slaughtered when the macroscopic and histological appearance of the quarter was found to be normal.

Infusions with Oily Suspensions

A cow which was giving 2½ gallons of milk per day was infused into each of the two left quarters with 1 c.c. of a suspension of *M. lacticola* in arachis oil. A similar dose of a suspension in arachis oil of the acid-fast bacillus from Case No. 4 was infused into the two right quarters of the same cow. Throughout the six weeks' period for which the cow was retained before slaughtering both organisms were recovered regularly in large numbers from milk samples from the quarters.

There was a progressive induration of all quarters and clinically the mastitis produced was indistinguishable from tuberculosis. In addition to the general painless induration the two hind quarters contained nodules which were easily

palpable in the area of the septum. They were felt high up in the udder as well as near the teat bases.

The milk from the two left quarters was not grossly abnormal but it tended to be watery in appearance and sometimes contained a few clots. Towards the end of the six weeks' period the milk from the two right quarters became thick, yellowish, and contained many clots.

On *post-mortem* examination all quarters of the udder were fibrous and had a brown mottled appearance. Hazel nut-sized fibrous nodules were present in the two hind quarters. The supramammary lymph nodes were normal. *M. lacticola* was cultured from the two left quarters and the acid-fast bacillus of field Case No. 4 from the two right quarters.

The histological picture was exactly like that of the field cases. A greater degree of fibrosis, giant cell formation and general cellular reaction had occurred in the two right quarters than in the left quarters. The bacilli were again confined to the circular spaces and surrounding leucocytic rings. The bacilli from Case 4 were more acid-fast than *M. lacticola* and were not decolourised in sections stained by the Ziehl-Neelsen method. Some of those in the leucocytic rings were very like *M. tuberculosis* in their morphology, beaded staining, and general arrangement.

Infusions of the Acid-fast Bacilli in Penicillin Oil Wax Suspensions

Several loopfuls of *M. lacticola* were introduced into a collapsible tube of arachis oil beeswax preparation containing 100,000 units of penicillin. The acid-fast bacillus from Case No. 4 was added to a second tube. One of these preparations was infused into each of two quarters of a cow giving 2 gallons of milk per day. The quarters became infected and at the end of three weeks swelling and induration were present.

The cow was slaughtered and the infused quarters were brownish in colour with white lentil-sized areas which were widely distributed throughout the tissue.

Lesions similar to those present in the field cases, but at an earlier stage of development, were found on microscopic examination of sections of these quarters. The circular spaces, an inner ring of leucocytes and lymphocytes, and an outer layer of histiocytes, lymphocytes, plasma cells, some incomplete giant cells, and a few fibroblasts were evident. The bacilli were again found in the spaces, both *M. lacticola* and the other bacillus were acid-fast in frozen sections stained by the Ziehl-Neelsen method. In frozen sections stained with Scharlach red, some of the circular "spaces" stained an orange colour throughout whilst others had an orange ring, and a few showed evidence of the substance flowing from them.

Infusions of Penicillin, Penicillin Procaine, and Sulphone-in-oils

A cow which was giving 2 gallons of milk per day was infused in three quarters of the udder, one with penicillin in arachis oil beeswax suspension, one with penicillin procaine in the same suspension and the third with sulphone in light mineral oil. No clinical change took place in th udder during an observation period of three weeks. At the end of this period *post-mortem* examination showed no macroscopic abnormality of the udder tissue and histological examination revealed no lesions similar to those described in the previous experimental case.

All the cattle used for these experiments were tuberculin tested before and after the infusions and none reacted to either mammalian or avian tuberculins. Biological tests in *guinea-pigs* and rabbits were carried out on milk samples prior to the experiment and on milk samples and udder tissues afterwards. All these were negative for tuberculosis.

Discussion

Attention was first drawn to the saprophytic acid-fast bacilli by the discovery of the "butter bacillus" by Rabinowitsch in 1897, who showed that it was capable of producing local lesions in guinea-pigs when inoculated in infected butter and to a lesser extent when in aqueous suspension. This difference in the extent of lesions due to the suspending liquid was confirmed in laboratory animals by Grassberger (1899), Hagan and Levine (1932), Feldman (1936) and Hole and Hulse (1939). Hole and Hulse (1939) also showed that this applied to cattle following intradermal and subcutaneous inoculations.

Although these organisms have been isolated in a number of diseases of man and animals, they have been much more frequently found in soil, dust, manure, milk and dairy products. Apart from errors which may arise on account of their similarity to *M. tuberculosis*, little significance usually is attached to their presence in discharges from lesions.

The methods of classification of Thomson (1932), Gordon (1937), and Gordon and Hagan (1938) have been followed in identifying the acid-fast bacilli. Those from the first three cases closely followed the description of *M. lacticola* given by Lehmann and Neumann (1899) and Jensen (1934). The acid-fast organism from Case 4 apparently belongs to Group II of Thomson's classification of the Mycobacteria, but it is doubtful whether the organism from Case 5 belongs to the Mycobacteria.

There can be little doubt that the organisms were multiplying in the affected udders because fairly numerous bacilli were present in milk samples throughout the periods of observation, which in some cases were as long as five months. The examination of sections showed that they were present in the granulomata, concentrated in spaces apparently formed by globules of oil. Hole and Hulse (1939) described similar spaces in lesions following subcutaneous inoculation of cattle with oily suspension of *Mycobacterium phlei*. Oil globules were also observed in tissue changes following intramuscular injection of vegetable oils which have been described in small animals by Deansley and Parker (1933), Emery *et al.* (1942) and Romansky and Rittman (1944), and in man, following intramuscular injection of penicillin in beeswax and arachis oil by Anderson (1949), and of procaine penicillin in arachis oil by Story (1950).

All the cases encountered had a history of treatment with oily infusions. Whether the original mastitis was due to the acid-fast organisms or not is not definitely known, as no examination to demonstrate their presence was carried out prior to treatment, but from the histories received it seems that the inflammatory reaction was at first acute as in streptococcal infections and that the more chronic indurating type began subsequent to the oily infusions. If this is so, the acid-fast organisms might have been introduced with the oily infusions or they might have been present in the udder without causing a reaction until they became suspended in oil. Mudd and Mudd (1924) and Reed and Rice (1931) showed that when acid-fast bacilli in aqueous suspension are brought in contact with oil they will pass to the oil, whereas non-acid-fast organisms remain in the water. Taking into account the number of cows' udders which are treated with oily preparations in present mastitis therapy and the results of infusion of these preparations described here, it is reasonable to assume that the oil *per se* does not cause progressive granulomatous lesions in the bovine udder.

Although it might be possible for the organisms to concentrate in globules of butter-fat or tissue-fat in the udder, the results of the experimental infections and of histological examinations indicate that the organisms require to be

introduced in an oily vehicle to cause a mastitis similar to the field cases described.

Summary

Five cases of bovine mastitis resembling tuberculosis, from which rapidly growing acid-fast bacilli were isolated, are described.

Numerous and repeated biological tests were all negative for tuberculosis.

The affected cattle did not react to either avian or mammalian tuberculins.

The lesions in the udders were granulomata containing giant cells. The acid-fast bacilli were concentrated in globules in the centre of the lesions.

All cases had a history of udder infusion of oily therapeutic preparations.

The condition was reproduced experimentally by the infusion of normal udders with oily, but not with watery, suspensions of the organisms.

In three cases the organism was identified as *Mycobacterium lacticola*. A description of its characteristics and of two unidentified acid-fast organisms is given.

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DAIRY HERD REDUCTION

At a recent meeting of the Border Milk Committee at St. Boswells it was stated that stocks of dairy cattle are being reduced and heifers that would normally have been put to milk are being slaughtered on account of the high feeding costs. Mr. W. Pate, Fairnielee, Galashiels, said that unless they were adequately compensated for their rising costs at the next Price Review in February a scarcity of milk would be inevitable.

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Weekly Wisdom

To give a dog a bad name is to license him to behave badly.—Lord Radcliffe (Final Reith lecture).

A NEW APPROACH TO PHENOTHIAZINE THERAPY IN SHEEP

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Introduction

Phenothiazine has been in general use as an anthelmintic for the treatment of the gastro-intestinal nematodes of sheep during the last 10 years, and there have been numerous papers describing detailed experiments to show the advantage of dosing with phenothiazine compared with other anthelmintics and with undosed animals.

On reading the early work of British workers, Taylor and Sanderson (1940), Boddie *et al.* (1941), Lyle Stewart and Crofton (1941), Peters and Leiper (1941), Imperial Agricultural Bureau (1943), there is general agreement that phenothiazine is the most efficient anthelmintic in removing the most pathogenic nematodes of the sheep, but it is surprising to find that the gains in weight following one, two or three doses of phenothiazine in lambs compared with undosed controls are comparatively small. On the other hand, farmers have rapidly taken to this new anthelmintic and it is the opinion of the author that farmers have obtained a better response to dosing with phenothiazine than has ever been shown experimentally. This state of affairs may be due to the fact that whereas farmers have dosed the whole of their flock, the experimentalist has dosed a proportion, leaving the others undosed for comparative purposes. These control animals have been grazed with the dosed animals and so the same opportunity for reinfection occurred in both groups. For instance, if the control lambs averaged an egg count of 1,000 e.p.g. and passed 2 lb. of faeces per day, each lamb would be depositing almost a million eggs per day on to the pasture, and the larvae which developed from these eggs would be equally available to the treated and untreated lambs, so that the effect of treatment would soon be obscured.

There is another aspect of phenothiazine therapy that has been largely ignored in this country from the point of view of control of gastro-intestinal nematodes of sheep. Small daily doses of phenothiazine are known to depress egg laying of the nematodes present and a high proportion of the few eggs that may be laid under these conditions do not develop to the infective stage. Britton, Miller and Cameron (1942, 1943) showed that in California when ewes were given access to 1 : 15 phenothiazine salt mixture from 30 days before lambing, they throve well and their lambs carried only very light infections at weaning time. In Britain, Harbour *et al.* (1946) have shown an increase in the weight gains of lambs given access to similar phenothiazine salt mixtures. Gibson (1945, 1949) has demonstrated the effects of small daily doses of phenothiazine in depressing egg laying of the horse strongyles, and Russell (1949) draws attention to the use of this method of therapy as a means of controlling nematode infections in foals and lambs.

The nematode egg output of ewes has been shown to vary round the year. On this point there have been extensive studies in Britain by Morgan and his colleagues (1947, 1950), Cushnie and White (1948) and Taylor (1935). These workers have all shown that there is a considerable increase in the nematode egg output in ewes during the spring of the year, designated by Morgan as the " spring rise," while during the rest of the year little contamination of the pastures

occurs from the ewes. Observations of our own have substantiated these findings (Leiper, J. W. G., unpublished).

It is significant that the ewes, during the spring, deposit large numbers of eggs on to the pastures and that these eggs will have developed to the infective stage on the pasture at a time when the lambs are just beginning to graze and are at the height of their susceptibility to infection. If one could reduce the massive infection of the pasture at this time the whole level of infection in the flock should be less and those that suffer most from these nematodes would benefit greatly from this method of management.

Following this line of thought an experiment was planned to discover whether phenothiazine medication of the ewes during the spring prevented the increase in nematode egg output, and also if any benefit resulted in the subsequent lamb crop.

Field Experiment

The experiment was carried out with young Clun ewes at the Veterinary Science Division of Boots Pure Drug Co., Ltd., experimental farm at Thurgarton, Notts. Use was made of both the anthelmintic property of phenothiazine in therapeutic doses and the depressant effect of small daily doses of phenothiazine on the egg laying capacity of the nematodes.

A flock of 37 gimmers (one-and-a-half-year-old ewes) were all tupped by the same tup in the autumn of 1950 and allowed the run of park land until February 28th, 1951, when they were divided into two groups at random—Group A and Group B. A 16-acre field on this park land was then divided into two equal halves by a longitudinal fence, Group A placed on one side of the fence and Group B on the other.

Group A gimmers were each dosed on February 28th with 30 grammes of proprietary phenothiazine by drenching, and from this date 1 gramme of phenothiazine per ewe was added to the daily allowance of 1 lb. of a concentrate mixture. This was increased to 1½ grammes of phenothiazine per ewe per day on April 4th (five weeks later) and continued until May 2nd, 1951 (a total of nine weeks).

Group B was placed on the other half of the field and left undosed, the same allowance of concentrates was given until May 2nd, but no phenothiazine was added.

From the beginning of the year until the close of the experiment faecal samples were taken from all the ewes and egg counts carried out every two weeks on individual samples by a modified McMaster technique. Graph I shows the average egg counts of the two groups. Only eggs of the bursate nematodes (with the exception of *Nematodirus*) have been plotted on the graph since only very few other eggs were present. It is doubtful, however, whether phenothiazine has any effect on these other parasitic nematodes of sheep. It will be noticed that the treated group did not show the "spring rise" while the untreated group showed a considerable rise with a peak of over 1,000 e.p.g. on March 21st.

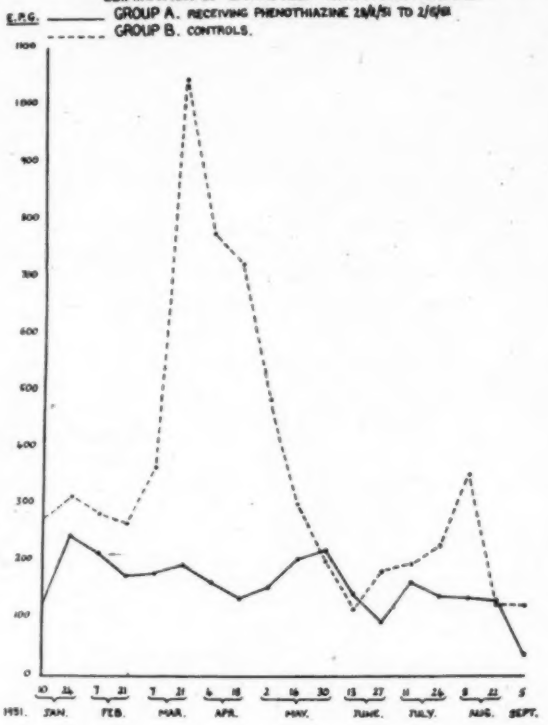
The criterion of efficiency of this method of control of parasitic gastro-intestinal nematode infection was based on the weight increases of the resulting lamp crops.

Lambing commenced on March 8th and was completed by April 9th. The 1951 spring was very late and the weather was very bad for lambing, while the ewes were young and carrying their first lamb crop; these factors accounted for the comparatively low lamb crop of 122 per cent. reared lambs. The average age of the lambs reared from Group A gimmers was 1·3 days greater than the average age of the lambs reared from Group B.

GRAPH I.

FORTNIGHTLY AVERAGE NEMATODE EGG COUNT ON CLUN EWES.

ELIMINATION OF "SPRING RISE" WITH PHENOTHIAZINE.



Data as to the number of ewes and lambs in Groups A and B are given in Table I, and it will be noticed that there was little difference in the numbers of animals in each group throughout the experiment; the two groups are therefore comparable.

Post-mortem examinations were carried out on animals which died during the experiment. Diagnoses as to the cause of the deaths are enumerated in the table. Worm counts were also carried out on the dead sheep but they did not give very much information, there being too few to make a comparison between Groups A and B. Moderate infections with nematodes of the genera *Ostertagia*, *Trichostrongylus*, *Cooperia* and *Chabertia* were present and in two animals a light infection with *Haemonchus*.

On May 2nd the lambs were weighed individually and at this date their average age was approximately six weeks, weights were then taken every two weeks and the average weight increase from May 2nd to September 5th is shown on Graph II. The park land pasture was of moderate quality, but it was not good enough to finish the light-weight lambs. This is evident from the poor weight gains during the period of August 8th to September 5th.

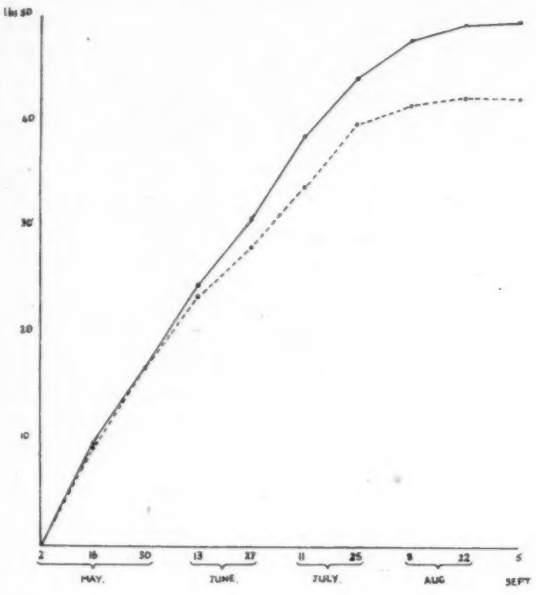
It will be seen from Graph II and Table II that the average live weights of the lambs from Group A have remained fairly level with those of Group B until June 27th, and from then onwards there was a progressive increase in the average weights of Group A over Group B. The increase in average weight gains of Group A was significantly greater than that of Group B from July 11th onwards. This is statistically significant as shown by the *t* test.

GRAPH II

AVERAGE WEIGHT INCREASE OF LAMBS FROM 2/5/51.

GROUP A. DOSED EWES' LAMBS.

GROUP B. UNDOSED EWES' LAMBS.



GRAPH III

AVERAGE WEIGHT INCREASE OF LAMBS FROM 2/5/51.

GROUP A. DOSED EWES' LAMBS.

GROUP B. UNDOSED EWES' LAMBS (NOT STRUCK).

GROUP B. UNDOSED EWES' LAMBS (STRUCK).

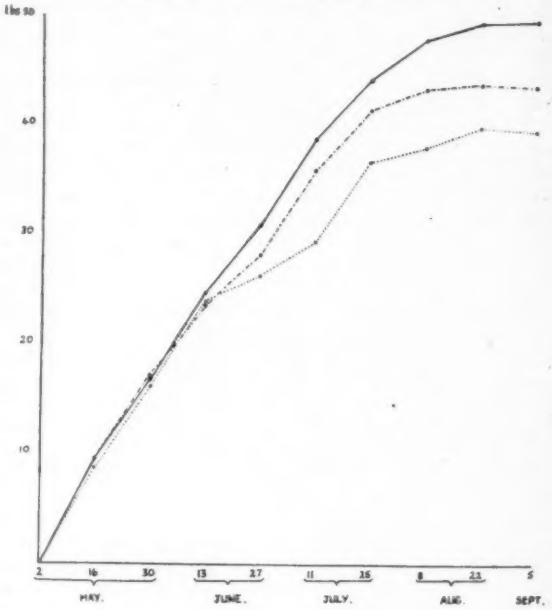


TABLE I

Group	Number of ewes	Number of deaths and cause	Number of lambs born	Number of lambs reared to two weeks of age	Number of ewes suckling twin lambs		Lamb deaths over two weeks old and cause	Number of lambs reared to 5.9.51
					At two weeks of age	On 5.9.51		
A		1 entero-toxaemia					1 entero-toxaemia 1 pneumonia	
	19	1	32	25	9	7	2	23
B		1 acute mastitis					1 fracture of humerus 1 " wool ball " 1 intestinal haemorrhage	
	18	1	29	25	10	7	3	22

TABLE II

Fortnightly weights of lambs from dosed ewes (Group A) compared with control (Group B) in lb.

	Date	2.5	16.5	30.5	13.6	27.6	11.7	25.7	8.8	22.8	5.9
Group A											
Average weight		29·39	39·05	46·26	54·13	60·26	68·04	73·35	76·96	78·48	78·61
" " increase			9·65	16·87	24·74	30·87	38·65	43·96	47·57	49·09	49·22
Group B Control											
Average weight		30·54	39·81	47·36	54·14	58·77	64·41	70·32	72·00	72·77	72·63
" " increase			9·27	16·82	23·60	28·23	33·87	39·78	41·46	42·23	42·09
Difference in average weight gain			0·38	0·05	1·14	2·64	4·78	4·18	6·11	6·87	7·13
t for difference of average weight gains ...						0·769	2·036	2·265	2·458	3·565	3·928
P						—	<0·05	<0·05	<0·02	<0·001	<0·001

Members of the staff, on examination of the two groups of lambs, were unanimous in their opinion that the lambs from Group A were superior in every way to those of Group B. There was more bloom, a general better appearance and less diarrhoea in Group A lambs. The shepherd also commented that Group A was very much easier to shepherd than Group B. At the conclusion of the experiment there were 12 out of the 23 lambs in Group A of 80 lb. live weight or over, compared with only five out of the 22 lambs in Group B, and the average weight increase was 7 lb. in favour of Group A.

The ewes were weighed at the conclusion of the experiment on September 5th. The ewes in Group A averaged 140 lb. and Group B 138·2 lb.—this difference, however, is not significant.

Another aspect of the experiment came to light from observations on blow-fly strike. During the period of experiment there was only one body strike in one of the lambs in Group A but in Group B there was one lamb with body and six lambs with tail strike. The one strike in the lamb of Group A did not result in a reduction of the average weight increase for that period but some of the strikes in Group B caused poor weight increases. All the strikes occurred between June 24th and July 31st. Graph III has been included to show the average increase of weight of the seven struck lambs, as distinct from the 15 unstruck lambs of Group B, compared with the average weight increases of Group A lambs. The increase in weight is by no means due solely to the lack of blow-fly strike in the treated group. Actually there was an average increase on September 5th of 5·7 lb. in the lambs from the dosed ewes compared with unstruck lambs from the undosed ewes.

Egg counts were carried out on the lambs on June 27th, August 22nd and September 5th. The averages of these are tabulated in Table III ; it will be noticed that on each occasion the lambs of Group A had a lower average count than Group B. This difference, however, diminished as the lambs increased in age and was statistically significant only on June 27th.

Table III

Average Egg Counts in e.p.g. of Lambs from Groups A and B

	Date	27.6	22.8	5.9
Group A		241	641	380
„ B		573	869	466
Average age in weeks ...		14	24	26

Discussion

The logical approach to the control of gastro-intestinal nematodes in lambs is one of prevention rather than cure. It has been said that a sheep's worst enemy is another sheep, but Maurice Hall's dictum " Permanent Pastures Perpetuate Parasites " should, in the light of recent knowledge, be replaced by " Parents Perpetuate Parasites." Infective stages of parasites will naturally die with time on the pastures unless they reach their definitive host. It is the infected animal that is continually reinfecting the pastures and without this reinfection the parasites would soon become extinct. It is significant that ewes naturally have a marked increase in their nematode egg output in the spring of the year and that the peak of this increase roughly coincides with the birth of the lambs. The ewes are, in fact, heavily seeding the pastures with eggs that will develop to the infective stage by the time the young commence to graze.

Egg counts are a measure of the rate of deposition of eggs on to the pastures. However, they are not necessarily a measure of the damage done to the host by the infection. It is very difficult to correlate weight increases of lambs with egg count, and even to correlate egg count with *post-mortem* worm counts. All one can say from an egg count on a sheep is that there is probably a high, medium, or low nematode infection. One cannot obtain any information as to the numbers of immature larval forms present, nor can one say how much damage is being done to the host from egg output estimation. It is quite possible that immature nematode parasites cause as much damage to their host as, or even more than, mature parasites. It is well recognised that the gastro-intestinal nematodes cause considerable loss in sheep but it is very difficult to lay down figures as to how much damage is done by a given worm burden. There appears to be a tremendous variation in the individual's capacity for carrying these infestations, the so-called " tolerance " appears to play an important rôle.

In order to control gastro-intestinal nematodes of lambs it is far better to prevent infection of the lambs rather than to wait for infections to establish themselves and then treat with an anthelmintic. Before treatment is adopted damage has already been done to the host during the establishment of the infection and a further build-up of infection on the pasture has already occurred. Phenothiazine is not only an efficient nematicide in sheep but it also has the remarkable property that small daily doses prevent egg laying of the parasites. Greater use of this property should be made, in the opinion of the author, for controlling nematode infections of sheep and lambs.

The experiment here reported shows that by the use of phenothiazine medication of the ewes during the period of greatest nematode egg output (10 days before lambing commenced until four weeks after completion of lambing) the so-called " spring rise " in egg output has been prevented and that the lambs from these treated ewes gained weight more rapidly than those from untreated ewes on adjacent similar pasture. These lambs were also free from tail strike, whereas in the lambs from the unmedicated ewes there was a high percentage of tail strike.

There is no difficulty in the administration of the therapeutic dose of phenothiazine to the ewes prior to lambing, nor with low-ground ewes is there any difficulty in the daily administration of small doses of phenothiazine because extra food as a concentrate mixture is usually given during and immediately after the lambing period and phenothiazine will readily be taken mixed with the food. With hill sheep, however, concentrates are not normally fed, and the only practical method of administering the small daily dose is by means of salt licks. The success of this method of control in the case of hill sheep is therefore dependent upon sufficient phenothiazine-salt lick being consumed to depress egg laying.

The lambs have not been dosed in this experiment, and although they benefited from the dosing of the ewes they did acquire an appreciable infection. Further work must be carried out in order to discover whether small daily doses given to the lambs either mixed with the food, where creep feeding is practised, or as a salt lick, would have the added effect of reducing contamination of the pastures, and whether a further benefit results in their weight increases.

Summary

An experiment has been carried out to show that a measure of control of gastro-intestinal nematodes of lambs can be accomplished by dosing the ewes with 30 grammes phenothiazine 10 days prior to commencement of lambing and

continuing with small daily amounts of phenothiazine in the food for a period of nine weeks. At five and a half months old the lambs from the treated ewes gained an average of 7 lb. more than the lambs from the untreated ewes. Blow-fly strike of the tail did not occur in the lambs from the dosed ewes, whereas six out of 22 lambs in the control flock were struck on the tail. When weight gains of the unstruck control lambs were compared with the lambs from the dosed ewes there was still an average weight increase of 5·7 lb. in favour of this method of phenothiazine therapy.

Acknowledgments.—The author wishes to thank Sir Jack Drummond, F.R.S., Director of the Research Department of Boots Pure Drug Co., Ltd., for facilities provided for this work; Messrs. D. L. Hughes and W. M. Brownlie, for their interest and help; and Miss J. Crowley and Miss M. Wallwin for technical assistance.

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HANDLING OF *BR. ABORTUS* VACCINE: AN OCCUPATIONAL RISK?

In its parallel feature to our own "Questions and Answers," the *British Medical Journal* publishes the following in its issue of December 8th:—

Q.—*A veterinary surgeon who is said to have had brucellosis on two occasions and frequently handles* Brucella abortus *vaccine has a chronic conjunctivitis, thought to be due to sensitivity to this organism. (a) Is this a tenable diagnosis, and how may it be confirmed? (b) If so, is it possible to desensitise him? (c) Is there any risk of precipitating chronic brucellosis during desensitisation?*

A.—Under the conditions mentioned, sensitivity to *Brucella abortus* vaccine is a tenable diagnosis which could be confirmed by watching the effect of the vaccine diluted, say, 1 in 100, and if no reaction diluted 1 in 10, when dropped into the eye. This might, however, be a very unpleasant proceeding. A skin test with "brucellin" would certainly be positive with the history given and would give no help. Desensitisation with an abortus vaccine could never produce chronic brucellosis, but the clinical benefit obtained therefrom would be problematical. More certain results would be obtained by protecting the eyes with eye shields, and by taking strict precautions to ensure that any vaccine which might contaminate the skin is washed away by frequent cleansing of the hands.

* * * * *

Ayrshire Breed Film: "*Progress to Pedigree.*"—On Thursday, December 6th, 1951, at the British Council Theatre in London, the Ayrshire Cattle Breeders' Association of England and Wales showed a new colour film entitled "Progress to Pedigree" to an invited audience. The film is a straightforward one designed for lay people. Its purpose is to draw attention to the attractions of the Ayrshire breed as well as to interest farmers who are already members of the Association. The main point of interest to Ayrshire owners is the running commentary on the points to be looked for in a supreme champion of the breed, which is shown on the screen.

CLINICAL COMMUNICATION.

CAESAREAN SECTION IN THE COW

GEO. N. GOULD, M.R.C.V.S.,
Southampton

On account of the similarity of the site of operation selected, the publication of the article "Caesarean Section in the Ewe," by F. J. Milne, M.R.C.V.S., has stimulated me to record the technique of caesarean section in the cow which I have used with minor variations for the last six years. The operation is usually conducted in a box, if available, or in the cowshed on a clean straw bed previously dampened to reduce the rise of dust, or in the open.

Protective Clothing.—Three-quarter length rubber boots have the advantage of protecting the knees during the period of kneeling while operating.

Rubber or plastic type of parturition overall sponged down with a detergent or antiseptic solution immediately prior to operation.

Instruments.—One tray of sterilised instruments containing two Bard Parker scalpels with No. 10 blades, two pairs rat tooth dressing forceps, eight pairs artery forceps, one pair half-curved blunt-pointed scissors, one pair straight-pointed dressing scissors, one needle holder, three full-curved round-bellied needles size 2, three full-curved triangular needles size 2, catgut tube breakers.

A second tray containing an adequate proportion of sterilised swabs, No. 8 nylon, four cloths for draping the site of operation 2 feet 6 inches square, eight towel clips to fix the cloths, two obstetric chains with fitted handles, one pair shoulder length surgical rubber gloves.

Suturing Material.—Chromic catgut No. 1.

Washing Up.—Two sterilised buckets of clean warm water with antiseptic added.

Anaesthesia.—Chloral hydrate is the anaesthetic of choice.

A rope is applied in readiness to cast by Reuff's method, but the patient is not cast until chloral hydrate solution (made up by adding 2 oz. M. & B. solution—each fluid drachm of which contains 60 grains chloral hydrate—to 1 pint of sterile distilled water) at approximately blood heat has been administered to the point at which the cow is becoming unsteady and will fall easily in her own length following a pull on the rope by one man. A second man is at the head and when the cow falls to the ground he kneels on the neck while chloral is continued to the anaesthetic stage. During the period of interruption, while casting, the flutter valve has been detached from the 3-inch needle in the jugular vein. Before recommencing administration, care is taken to ensure it is still free in the vein, by tightening the choke rope.

The majority of cases calling for caesarean operation are those in which the calf is dead or is a monstrosity, but there is no reason why chloral, as a narcotic, and chloroform, or chloral and local anaesthetic could not give satisfactory anaesthesia if it was important to effect delivery of a live calf.

The chloral hydrate injection is made into the right jugular vein, care being taken to push the cow on to her left side as she falls—the needle then being in a convenient position to continue administration, the patient lying flat out on her left side with all four legs extended.

Operative Procedure.—An area about 2 feet 6 inches square is shaved and cleansed with spirit to permit a central incision, extending from a point on the ventral line of the abdomen as the cow lies on her side, vertically on an

imaginary line which would pass 3 inches behind the posterior border of the last rib and meet the spine at right angles. The incision is actually below the rib as indicated in the photograph, and is about 2 feet long.

The incision is made through the skin, muscles (which are fairly thin at this site) and peritoneum which is thick and easily picked up. Sterilised surgical rubber gloves, shoulder length, are worn. The incision is found to open on to the reflected omentum which hides the abdominal contents from view and which tends to impede protrusion of small intestine. The hand is inserted at the posterior part of the operation wound and the omentum pushed forward. The pregnant horn lies just beneath. The foetus is located and in an anterior presentation the hock can usually be grasped and brought into the wound ; a supporting ligature, of thick silk about 2 feet long, is inserted through the wall of the uterine horn, artery forceps being applied to the end and handed (without touching his hands) to an assistant (unskilled) who is kneeling opposite to the surgeon. A second ligature is then applied about 2 inches from the first, and passed to the same assistant to take in his other hand. With his arms extended he pulls the uterine wall into the wound in the form of a tent, the omentum having been pushed forward by the surgeon—on the principle of the sliding door. The surgeon then makes an incision into the uterus of sufficient size to allow delivery of the calf (usually about 18 inches long). The hand is inserted, the hock grasped and the legs straightened out and the foot brought through the uterine incision. The same procedure is followed with the second hock and the surgeon then applies to the hocks short, sterilised obstetric chains which he hands to the second unskilled assistant, again without touching his hands. He then instructs him in respect of traction to effect the easiest possible delivery to minimise tension on the broad ligaments.

The usual method of delivery is to direct the pull backwards towards the foot of the patient's extended hind leg, the surgeon helping to turn the calf, to direct the hind quarters and abdomen through the wound laterally and the thorax vertically.

The uterine tent is still held by the first assistant. The surgeon ascertains whether or not the foetal membranes are free and can be detached without difficulty. If so, they are removed, but if firmly adherent no attempt is made to do so. In such cases, however, the edges of the foetal membranes at the site of incision are trimmed up with scissors to reduce risk of engaging them in the suturing of the uterine wound. The operation area is cleaned up with swabs and $\frac{1}{2}$ mega unit of streptomycin, preferably in oil, is inserted into the uterus.

The incision is then closed with a continuous catgut blanket type suture, using a fixation suture from time to time (*i.e.*, two or three times) by making a second blanket type suture behind the previous one, inserted in the form of a clove hitch. Subsequently a continuous Lembert suture is inserted and the uterus returned to the abdomen, the supporting ligatures previously having been severed.

It will be found that the omentum slides over the operation wound, impeding protrusion of the small intestine. (I usually return the uterus as far back as possible towards the pelvic cavity, having the impression, following checking by subsequent rectal examination, that this stimulates more rapid involution, particularly in those cases in which the foetal membranes have been removed, thus reducing the risk of possible adhesions.)

The peritoneum is then sutured with No. 1 chromic catgut, using a continuous blanket type suture ; the muscles are sutured similarly, using double No. 1 catgut. The skin is then sutured, using nylon and Halstead-type sutures, and dressed with sterilised sulphanilamide. A roller type towel is used as a protective dressing—placing it around the abdomen to cover the operation area and fixing it over the back to a show-type light rug to keep it in position.

After-treatment.—The patient is put up on to her sternum, turned on to the right side, and made comfortable by being propped up with bales or trusses of straw. She usually rises to her feet in three to four hours and will take water and food before that. This is permitted in restricted amounts over a period of the first 24 hours and subsequently the patient receives her normal ration if she will eat it.

A daily check of the temperature is taken following the operation and 1 or 2 mega units of penicillin intramuscularly are repeated daily for three days after the operation. Skin sutures are removed on the seventh or eighth day. More often than not, healing is by first intention.

If the membranes are retained the penicillin injections are continued until they are voided—usually by the third to fifth day. Manual attempt at removal is not recommended.

Variations in Technique.—Where presentation is posterior the hand is inserted and it is usually possible to grasp the knee which is brought into the operation wound as described for the hock, and the ligatures applied. The method of removal of the foetus resembles that already recounted, the feet and head being brought out of the uterus and traction directed as described previously—chains being applied to the legs.

Where a *Schistosomus reflexus* or other monstrosity is present an embryotome can be introduced through the uterine incision to divide the foetus into two or more pieces prior to removal, to avoid undue traction and tearing.

Where torsion exists, irreducible by rectal or vaginal "swinging" or by rolling the cow, the displacement caused may make it difficult to bring the uterine wall into the wound, and it is advisable, therefore, to correct the torsion through the operation wound prior to attempting to do so. The correction of the torsion by "swinging" is usually easy once its direction has been ascertained. The hand is inserted either to the left or to the right accordingly, a prominent part of the foetus grasped and rocked, and then with a sudden movement the uterus is swung into the correct position.

Where there is an emphysematous calf, difficulty may be found in bringing the uterine wall into the operation wound by grasping the hock or knee, owing to the close contact of the calf and the uterine wall and gas present. It may be necessary to insert the hand into the abdominal cavity and lift from the bottom in order to insert the supporting ligatures

and in that way bring the uterine wall into the operation wound. A skilled assistant is very helpful in such cases. In these it is advantageous, after inserting the ligatures, to fix the uterine wall by inserting temporary catgut sutures at either extremity of the wound and laterally, prior to making the uterine incision. The uterine wall is held out in the form of a tent by supporting ligatures as before described. Swabs are applied to take care of any possible seepage. If emphysema is very marked, delivery may be assisted by incising the foetus in a number of places (particularly the abdomen) to reduce size. Care is required in cleaning up following removal of the calf and foetal membranes. I recommend that at that time the shoulder length gloves be changed for a second sterilised pair. The temporary catgut sutures are then removed and ½ mega unit of streptomycin is inserted into the uterus and 1 mega unit penicillin into the peritoneal cavity, prior to suturing in each case.

Discussion

Recovery from the operation in cases not subjected to previous prolonged manual attempt at delivery is usually uninterrupted and interference with production and future breeding capacity apparently remarkably small.

Accurate figures of future breeding capacity are not known with certainty as in a number of cases no attempt was made to breed subsequently, but in cases where breeding has been attempted no undue difficulty has been found. I have records, among others, of one cow which has had three calves following operation in 1947 with production records of 1,000, 900 and 900 gallons in the three subsequent completed lactations, and a Jersey heifer operated on in 1949 which delivered a live calf 11 months and one week after operation —the heifer having been served in error owing to a misunderstanding of instructions by an under cowman.

Caesarean section in the bovine is an operation which can be carried out on the farm if necessary with unskilled assistance, with less risk to life than that entailed by prolonged manual delivery, prolonged embryotomy or heavy traction, less interference with future production and less risk of delay or failure to breed subsequently. The selection of cases is the important factor and is dictated by an early assessment of the dystokia present, of the interference likely to be necessary to effect delivery, and the probability of success with the least possible damage to the patient likely to be a risk to life, to future breeding capacity or to production. The number of such cases met with in a year is remarkably small, the vast majority of cases of dystokia responding to correction of presentation under epidural anaesthesia with or without limited embryotomy and reasonable traction, properly applied.

It is my experience that where prolonged or heroic measures are likely to be needed, caesarean section is indicated on the practical grounds of the saving of life, of production and of breeding capacity and, in addition, of the long and often exhausting physical effort entailed to the operator.

The bovine is a remarkably satisfactory surgical subject and with the use of antibiotics as part of the technique and subsequent after-treatment, the results achieved are extremely good. The greater ease of handling the patient on her side, the advantage of making use of the omentum as a "shield" for the operation wound, the limitation of traction on the broad ligaments, and the facility with which the wound can be inspected and sutures removed appear to offer advantages over other sites of operation.

ABSTRACTS

B. anthracis: Sporulation and Viability in Relation to Environmental Temperature and Humidity*

The work reported is concerned with the epizoötiology of anthrax, with particular reference to hot countries. The observations were made on six strains. Since sporulation is the crucial point in the epizoötiology of this disease, the conditions, particularly those of air temperature, in which sporulation can or cannot take place require special consideration. Under most favourable temperature (98° to 90° F.) and other conditions (moisture, oxygen) a proportion of the bacilli exposed have completed the process of sporulation by 8 to 10 hours, at 70° F. by 24 hours. With time more and more bacilli form spores. Times such as those mentioned are important because if the infected material dries before then sporulation is prevented. This is likely to happen, for instance, in thin layers of blood exposed at relative humidities below 60 per cent. Similarly, sporulation on the opened carcase is largely dependent on the surrounding air temperature. At 90° F. spores are formed in the blood exuding from severed neck vessels, whereas at 60° to 70° F. the bacilli gradually disintegrate with the growth of contaminants. In blood removed from the carcase and stored at this lower temperature but at the same time protected from gross contamination, sporulation may proceed slowly.

The remainder of the observations are concerned with the survival of anthrax bacilli. In reality, this has rather less importance in practice owing to the ease with which sporulation can occur if temperature and moisture conditions become favourable. Experiments with anthrax bacilli in blood dried on slides and exposed in jars at various temperatures and humidities showed that survival depends on the rate of drying and the conditions of storage. Survival is promoted by slow drying in relatively moist air at room temperature followed by storage in dry air at room temperature. The best result was 90 days under these circumstances, while converse conditions bring about comparatively rapid death of the organism.

Anthrax bacilli contained in thin layers of blood were exposed to a number of different surfaces to test their bactericidal properties. The following surfaces were bactericidal: iron, zinc, copper, brass, limewash, lead paint and tar.

The bacilli survived for over 634 days in blood mixed with dry sterile soil and stored in dry air at room temperature. In wet sterile soil at 60° to 70° F. they survived for 38 days and for about half that time if the wet soil was not sterile. Sporulation can take place in dry sterilised soil if water is added to give a moisture content of about 3 per cent. Anthrax bacilli, or a fair proportion of them, which gain access to water will sporulate if the temperature is suitable (90° F.), if not (50° to 57° F.) they die out within five days. In this connection records are given of the mean morning and evening temperatures of water in ponds in North and South India over one year.

In goats dead of anthrax the bacilli commonly survive for a week in bone marrow (air temperature 64° to 74° F.) and for about two weeks in the skin (air temperature 50° to 60° F.). Survival in these situations is mainly a question of air temperature, and much longer periods have been noted by other workers.

* **Sporulation and Viability of *B. anthracis* in Relation to Environmental Temperature and Humidity.** Minett, F. C. (1951.) *J. comp. Path.* **60.** 161.

Trypanocides: A Review*

This review includes a very brief summary of the problem of trypanosomiasis, both human and veterinary. The author draws attention to the following conditions, originally stated by Davy, which are required in a trypanocide drug :—

1. The drug should cure with a single dose.
2. It should be generic in its action rather than specific.
3. It should have a prophylactic effect.
4. It should have a wide margin of safety.
5. It should be capable of being given subcutaneously.
6. The volume containing the dose should be small.

The drugs which have shown some activity in man are discussed, including the arsenicals, mixed arseno-antimono compounds, suramin and the amidines.

Considerable space is given to the drugs of veterinary interest. Dimidium bromide and antrycide are mentioned, particularly their disadvantages. The author includes some of the results of research on the phenanthridines. Several position isomers of phenidium chloride have been found to exceed it in activity, whereas some analogues of dimidium bromide equal or excel it. The triamino compound is considered by the author to be the most active drug yet described for treatment of *T. congolense*. A thienyl compound has also been found active against *T. congolense*.

Replacement of the 7-amino-group of phenidium chloride by a methoxy-group also, unexpectedly, resulted in a highly active compound.

The article is primarily intended for those with a knowledge of organic chemistry.

D. L. H.

* **Trypanocides: A Review.** Halls, L. P. (1951.) *Chem. & Indust.* No. 28. 606–610.

* * * * *

Absorption of Acetate, Propionate and Butyrate from the Rumen of Sheep*

In these experiments it is shown that the absorption of acetic acid occurs when the rumen contents are either acid or alkaline although absorption from an alkaline medium is less than from an acid medium.

Raising the concentration of volatile acid in the rumen increases the rate of its absorption, which agrees with the hypothesis that absorption is due to diffusion through "water-filled pores." This is particularly true of acetate. It is not possible to state whether there is a differential rate of absorption of acetate, butyrate or propionate, for many uncontrollable factors affect absorption rates. Experiments designed to test absorption from the rumen show a great deal of variation which may be accounted for in a variety of ways, but shock and circulatory disturbance due to surgical interference and manipulation of organs no doubt play a large part. Prevention of hyperactivity of the sympathetic system would appear to be a prerequisite for investigation of absorption from the rumen; therefore, anaesthesia of experimental subjects may be an advantage.

Analysis of the blood taken from a rumenal vein does not necessarily give a true picture of the rate of absorption of individual volatile acids from the rumen. The absorbed acetate and propionate can be accounted for in the rumenal vein blood but in the case of butyrate the venous blood concentration is low, suggesting that this anion is rapidly katabolised in the rumen wall. Further experiments showed that any propionate or butyrate passing to the venous blood is metabolised in the liver while acetate passes to the arterial side of the vascular system in measurable amounts.

Solutions of sodium acetate of *p*H from 8·6 to 9·6 when introduced into the rumen quickly became less alkaline. The *p*H was reduced to 7·4 to 7·6 within five minutes and then stabilising about this figure even during the absorption of acid. Analysis of these introduced solutions shows that the loss of fatty acid from the rumen is accounted for in part by the transference of carbon-dioxide and chloride from the body fluids although other factors also probably are involved.

Neither pectin nor cobalt appeared to affect the rate of absorption of fatty acids from the rumen.

F. R. B.

* **The Absorption of Acetate, Propionate and Butyrate from the Rumen of Sheep.** Masson, M. J., & Phillipson, A. T. (1951.) *J. Physiol.* **113.** 189.

REVIEWS

[**English Husbandry.** R. Trow-Smith. (1951.) 239 text pages; 23 illustrations. Faber & Faber, Ltd., 24, Russell Square, London, W.C.1. Price 18s. net.]

During the course of one's peregrinations through the countryside, one is generally so inclined to accept all that one sees at its face value that the urges and the evolutionary processes which brought these things into being are seldom considered except by the most erudite or contemplative individuals. The agricultural, and no less the veterinary field, which is so closely integrated with it, has evolved steadily as a result of the impact of economic and individual factors, to attain to-day a state of high complexity. The process through which this has been achieved is dealt with in a refreshing and not too academic manner by the author of this book. He traces from pre-historic times the changing face of the countryside up to the present day, describing the individuals and reviewing the economic factors which have played their part in the development of agricultural husbandry.

This book is very readable and will fill a gap in the knowledge of many who have an inclination to enquire into the origins of what to-day, seeing them all around, they have come to accept as quite natural and ordinary phenomena, such as the high-class dairy cow, pig, sheep and horse, the high standards of cultivation and the complex pattern of the countryside.

* * * * *

[**Proceedings of the British Society of Animal Production, 1950.** Obtainable from the Secretary/Treasurer, B.S.A.P., King's Buildings, West Mains Road, Edinburgh, 9. Price 10s.]

The Proceedings of the British Society of Animal Production for 1950 cover two meetings of the Society, the 13th and the 14th, held during that year.

The first occasion took the form of a joint meeting with the Society of Animal Behaviour on the general topic "Reproductive Behaviour in Cattle," and papers were received from Dr. A. Walton, Professor W. C. Miller, Mr. Geoffrey Smith, Dr. Margaret Jackson and Dr. J. A. Laing. The papers are published in full, together with a report of the subsequent discussion.

At the 14th meeting in Edinburgh, "Livestock Farming in the Lowlands of Scotland" was reviewed, with contributions dealing with the husbandry of sheep, dairy cattle, beef cattle and pigs. Together, these papers and the discussion thereon constitute a most useful survey of the present position of the livestock industry in the Scottish Lowlands.

In addition, the report contains details of the constitution of the Society and a list of members with their addresses. The latter includes the names of remarkably few veterinary surgeons, considering how intimately the work of the profession is linked up with the problems of animal production.

REPORT

[Report of the Medical Research Council for the Years 1948-50. Pp. 247. Published by H.M. Stationery Office, 1951. Price 6s. 6d.]

The present report, covering the period 1948-50, describes the changes in organisation which have taken place since 1945. This period is particularly noteworthy as the occupation of the new buildings for the National Institute for Medical Research has been completed. At the same time certain independent units of the Council have now been established in the old buildings at Hampstead. There has also been a considerable increase in the number of research establishments supported in whole or in part by the Council. It has therefore become impossible within the scope of a report of this nature to give details of results of all investigations. In future every important subject will be covered once in a few years.

The introductory portion, which in previous reports has given a brief outline of the major investigations, has been expanded to 46 pages. An excellent impression of the wide field which is covered and the substantial achievements which have been obtained in all branches of medical science can be gleaned from this section. The remainder of the document gives the composition of the various establishments aided by the Council with a very brief summary of the researches in progress. The lists of publications by members of the Council staff and by grant holders and others have been amalgamated into a single section.

Most of the investigations are directly concerned with some aspect of human medicine but there are certain items which have a bearing on veterinary science.

In the field of chemotherapy continued progress has been made in the development of new drugs for tropical diseases. Several compounds less toxic than emetine have been found which are being subjected to clinical trials. During the war a German preparation, "miracil," was effectively used to control schistosomiasis. It has the drawback of producing toxic side effects which have now been reduced by the discovery of a less toxic derivative. The study of filariasis has been accelerated through the discovery of suitable susceptible laboratory animals. It has been shown that the lungs form a reservoir in which larvae are preserved in large numbers and from which they emerge at night into the blood stream. A compound discovered by workers in the Lederle laboratories, U.S.A., called "hetrazan" has a marked effect on the larvae in the peripheral blood and can thus prevent infection of the insect vector.

In the field of antibiotics chloromycetin, aureomycin and terramycin, active against a number of bacterial diseases, have been studied intensively. More important, however, is their effect on rickettsial diseases and even some virus infections. A new field is here opening up which will undoubtedly yield valuable results. The great advantage of these substances is their lack of toxicity for the hosts' cells. The main advances, however, have undoubtedly been in the treatment of tuberculosis. Streptomycin is of value but has its limitations. Nevertheless, combinations of these newer antibiotics such as streptomycin and *p*-aminosalicylic acid may provide means for avoiding the development of drug resistance which so far has prevented the full exploitation of these agents.

The discovery of Q fever in man was reported in 1949. *Rickettsia burneti* has been recovered from human patients and serological tests show that infection may not be uncommon. Of particular interest is the isolation of the organism from the milk derived from two herds of cattle, coupled with serological evidence of infection in these and other herds. The organism apparently gives rise to no demonstrable signs of disease in cattle.

In the Council's Toxicological Research Unit attention has been devoted to toxic chemicals used in agriculture. The aromatic dinitro weed-killers and organo-phosphorus insecticides present a particular hazard to the agricultural worker. The possibility of poisoning by dinitro-*ortho*-cresol and parathion has been studied. It is satisfactory that no evidence has been found that the latter will persist on plants long enough to affect the health of the consumer.

The report is of value to all research workers in the biological sciences but would also prove of interest to practitioners.

R. E. G.

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, December, 1951

List of Successful Candidates

(*Concluded*)

London (continued):

Final Examination:

Aitken, Miss E. A.
Barker, G. L.
Bowley, M. I.
Boyde, Carl
Boys-Stones, P. A.
Brain, J. R.
Claydon, R. K.
Cook, T. F.
Davies, W. E. O.
Dwane, J. B.
Edwards, T. W.
Evans, D. A.
Evans, H. T. J.
Fishwick, Roy
Franks, P. W.
Gilmore, J. D.
Griffiths, K. P.
Holton, J. A.
Howard, R. W.
Jenner, F. H.
Kennea, T. L.
Lawson, M. R. (M)
Peacock, Ralph
Perrin, Miss P. E. V.
Peters, W. G. D.
Prasad, Y.
Price, C. J.
Price, M. C.
Rosser, I. J
Sparrow, W. B.
Stokoe, H. P.
Thomas, H. J. D.
Thomson, J. M.
Traynor, D. K.
White, Miss K. S.
Williams, W. D.

(M) denotes credit in Medicine.

NOTES AND NEWS

Diary of Events

Jan. 3rd.—Meeting of the Central Veterinary Society, at the Royal Veterinary College, Camden Town, 6 p.m.

Jan. 4th.—General Meeting of the Association of Veterinary Teachers and Research Workers, in the Veterinary School, 83, Buccleuch Street, Glasgow, 10 a.m.

Jan. 4th.—Meeting of the Association of Veterinary Teachers and Research Workers (Scottish Branch), in the University of Glasgow Veterinary School (83, Buccleuch Street), 9.30 a.m.

Jan. 9th.—Meeting of the Association of Veterinary Teachers and Research Workers (Southern Region), at the Royal Veterinary College, Camden Town, N.W.1.

Jan. 9th, 10th and 11th.—Meeting of Committees and Council, R.C.V.S., at 10, Red Lion Square, London, W.C.1.

Quarterly Meeting of Council and Committees, N.V.M.A.

Wednesday, January 30th, 1952

11.0 a.m. Home Appointments Committee.
2.0 p.m. Organising Committee.
4.0 p.m. Parliamentary and Public Relations Committee.
At 36, Gordon Square, London, W.C.1.

Thursday, January 31st, 1952
10.0 a.m. Veterinary State Medicine Committee.
1.30 p.m. General Purposes and Finance Committee.
At 36, Gordon Square, London, W.C.1.
Friday, February 1st, 1952
11.0 a.m. Council Meeting.
At the Connaught Rooms, Great Queen Street, W.C.2.

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OBITUARY

Hull, Charles Graham, M.R.C.V.S. Graduated Edinburgh, December 20th, 1892. Died December 17th, 1951; aged 81 years.

Sampson, Stephen Ernest, M.R.C.V.S., 47, Holme Lane, Sheffield, 6. Graduated London, July 16th, 1900. Died December 14th, 1951; aged 75 years.

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LEGAL NOTES

Docking and Nicking of Horses Act, 1949

Omission to Secure Veterinary Surgeon's Certificate

In our issue of January 21st, 1950, we published in full the provisions of the Act "to restrict the docking and nicking of horses and the importation of docked horses." The case reported below, and in particular the comments of the Stipendiary, reveal widespread ignorance of the terms of this important measure; indeed, it may be that some of our readers themselves may care to refresh their memories. A major requirement to be met by way of exception to the prohibition of the docking or nicking of horses is that the operation may be performed "in any case in which a member of the Royal College of Veterinary Surgeons, after examination of the horse, has certified in writing that the operation is in his opinion necessary for the health of the horse because of disease or injury to the tail," the penalty for contravention on summary conviction being a fine not exceeding £25, or imprisonment for a term not exceeding three months, or both such fine and such imprisonment.

Following is the report of the case, as it appeared in the issue of *The Merthyr Express* of December 1st:—

"Stated to be the first case of its kind in South Wales—and probably the first in the country—Lewis Edwards, of Ysgwyddgwyn Uchaf Farm, Deri, appeared at Pontlottyn Magistrates' Court on Friday accused of unlawfully docking a six-month-old colt.

"The farmer claimed he had been performing the operation with ether for 50 years without getting into any trouble.

"Sympathising, the Stipendiary (Mr. Joshua Davies, K.C.) said he would not have known it was now an offence had he not been a lawyer, and dismissed Edwards on payment of 4s. costs, together with Wm. Rees Price, a 47-year-old collier, of Bailey Street, Deri, who was charged with causing the animal to be docked.

"Prosecuting for the R.S.P.C.A., Mr. R. Freedman, M.A., Merthyr, explained that since January 1st, 1950, it was an offence to cut horses' tails unless a veterinary surgeon had certified in writing that the operation was necessary.

"R.S.P.C.A. Inspector A. E. Watts, of Awelfryn Terrace, Penydarren, said he was on duty at Nelson Cattle Mart on October 8th, when he observed the colt being offered for sale. Its tail was cut, and he approached Price, who said: 'Let us forget the matter, Inspector. I did not dock its tail—Lewis Edwards did.' Edwards had confirmed this."

Bull Claim Dismissed

In its issue of December 14th the *Farmers' Weekly* reports that in a recent case heard by Mr. Justice Parker in the King's Bench Division a claim brought by Messrs. W. Cumber and Son (Theale) Ltd., of Beansheaf Farm, Theale, near Reading, concerning the ability of a bull to get stock, was dismissed. Messrs. Cumber had asked for a declaration that they were entitled to reject a four-year-old Shorthorn bull, Streetly Lord Barrington 21st, bought from Mr. William Marsh Good, formerly owner of the Sibson Manor attested Shorthorn herd, and the return of 800 gns. purchase money, on the ground that the bull was incapable of getting stock when so'd.

Judgment

Giving judgment, his lordship said that the bull was acquired by Mr. Good as a yearling in 1946 for 1,500 gns. over a bid at a Reading auction sale of 1,450 gns. by Messrs. Cumber, who had been keen to purchase it for breeding purposes. When the Sibson herd was broken up in September, 1949, Messrs. Cumber bought it for 800 gns. and afterwards discovered that it had difficulty in serving without manual assistance. The auction sale was subject to the rules of the Shorthorn Society, rule 12 of which laid down that all bulls aged 12 months or over which fetched 25 gns. or more should be sold as "capable of getting stock."

As a result of the difficulties experienced with the bull, Mr. G. N. Gould, of Southampton, was appointed by agreement as an independent veterinary surgeon under the Society's procedure. After making a test, Mr. Gould certified that the bull was incapable of getting stock naturally owing to an anatomical defect.

Mr. Justice Parker said that evidence had been given that in the three years preceding the sale the bull had served 186 cows in the Sibson herd and had sired 121 calves, so that there was no question of infertility, and the defendant had stated that assistance was necessary only occasionally.

The plaintiffs contended that the words "capable of getting stock" meant that an animal should be capable of doing so naturally and without manual assistance, but the defendant claimed that if a bull had served successfully it was capable of getting stock and did not cease to be capable because some slight manual assistance was necessary.

It had been argued that a bull could be capable of getting stock by artificial insemination, but, his lordship said, he thought that in view of the fact that the conditions of sale were introduced long before artificial insemination was considered, the phrase must mean capability of getting stock in the natural way. That did not mean, however, that every step in the process must be done by the animal alone, and he thought that in the present case the bull was capable of getting stock even though some slight manual assistance was given.

The evidence on all sides was that the giving of assistance presented no difficulty, and, while sympathising with the desire of the plaintiffs to have a bull which would be no trouble to them, he could not say that the bull in question was in breach of the conditions of sale.

Judgment was given for the defendant, with costs.

* * * * *

Failure of Charge of Over-stocking

At Southminster Petty Sessional Court, recently, Samuel Joseph Sutton, of Brook Farm, Burnham, was charged with causing unnecessary suffering to three cows. Mr. J. C. Lamb appeared on behalf of the R.S.P.C.A. and Mr. R. H. P. Young was for defendant, who denied the offence.

Horace Edmund Pope, an inspector of the R.S.P.C.A., stated that he went to Brook Farm about 5.50 p.m. on Sunday, October 7th, in company with P.C. Viney. He heard considerable bellowing and went to a field containing 10 cows. He first saw a blue roan cow which was trying to get out of the meadow. The animal's back was arched and milk was running from its teats, showing every symptom of being badly over-stocked. The udder was hot and hard. Witness also saw a red Ayrshire cross cow in a similar condition, bellowing and showing signs of distress, and there was a black cow also in his opinion over-stocked, but not to the same degree. Steps were taken to relieve the animals, and he estimated that about 2 gallons of milk were taken from the Ayrshire. In fairness to defendant, witness said that all the animals were in good bodily condition and the farm appeared to be in good heart.

Cross examined by Mr. Young, witness agreed that if a cow was continually stripped the milk would not dry up. He was not aware that it was a common practice to dry off cows by ceasing milking altogether.

P.C. Viney gave corroborative evidence as to the condition of the animals and said that later in the evening defendant telephoned him asking the reason for the visit and adding "There was no cruelty, I am drying the cows up."

Mrs. Lucy R. Robinson, M.R.C.V.S., of Purleigh, described the symptoms of over-stocking in cows, and said it should not be necessary, when drying cows up, to let them get into a greatly overstocked condition: a certain amount of milk should be drawn off to avoid pain and discomfort.

Defendant said that on October 7th he was milking three cows, all of which he was drying off. The average production of the Ayrshire cow in full milk was about 7 gallons a day and the other two 6 gallons. They were normally milked twice a day, but at this particular time he had reduced milking to once a day, about 6.45 p.m. He produced his Milk Marketing Board figures for October, showing for October 8th a total of 2½ gallons, which represented the milk taken by the Inspector from the Ayrshire. The average total amount shown by the records was about 3 gallons daily. There would be 2 or 3 pints used in the house and no other milk was used. He had never noticed any distension of the udders and there was no suggestion of cruelty if one cow had 2 gallons in her.

Cross examined, defendant agreed that the symptoms described might be those of over-stocking, but thought both the inspector and the police officer were mistaken. The three cows were milked about 7 p.m. on the Saturday.

For the defence, evidence was given by Mr. H. D. Sparrow, veter-

jinary surgeon, of Rochford, and by Mr. W. J. McMeekin, Southminster, assistant to Mr. P. G. Ledger, M.R.C.V.S., both of whom inspected the animals on October 9th and 10th and could find no signs of over-stocking. They were in process of being dried off, and Mr. Sparrow stated that the most humane method of doing this was to milk irregularly.

Mr. Young referred to the Marketing Board figures, said that his client was drying the cows off to get them into a condition for calving, and alleged that there was no evidence of cruelty.

After deliberation, the Chairman said that the Magistrates had gone into the case very carefully, and although they were anxious that there should be no cruelty to these three cows, they were of the opinion that the charge had not been proved. The summons would therefore be dismissed.

An application by Mr. Young for costs against the R.S.P.C.A. was refused.

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Fine for Leaving Drugs in Car

The Medico-Legal Correspondent of *The British Medical Journal* contributes the following to the issue of December 8th:—

By Article 4 of the Dangerous Drugs Regulations it is provided that every dangerous drug or preparation in the custody of an authorised person must be kept in a locked receptacle which can be opened only by him or another authorised person, except when the necessities of the practice of his profession, function, or employment otherwise require.

On May 4th a doctor pleaded guilty at Chatham Magistrates' Court[1] when summoned for keeping dangerous drugs otherwise than in a locked receptacle, and was fined £10 and £2 2s. costs.

The circumstances were that on the evening of March 20th a soldier opened the door of the doctor's car, which was standing outside a hotel where the doctor was visiting a patient, and abstracted a case containing morphine, codeine and phenobarbitone. He took it back to barracks with him and put it under his bed, but in the morning turned it over to the military authorities. The doctor meanwhile had noticed his loss when he got back to the car and immediately reported it to the police. He had had the bag with him because on a previous visit he had had to administer morphine, and he was driving a strange car while his own was under repair, which was why the car door was not locked.

Even if the car doors had been locked the doctor would still have been in breach of the regulation. It was decided by the King's Bench Divisional Court in October, 1949,[2] that a locked motor-car is not a "receptacle" within the meaning of Article 4. In that case the doctor had left drugs in an unlocked case inside a locked car and the whole car was stolen.

The Lord Chief Justice, Lord Goddard, in deciding that a breach of the regulations had been committed because a car was not a "receptacle," pointed out that he was deciding the case on its own particular facts, and that he was not speculating what the results would have been if the case itself had been locked or if there had been a locker in the car in which the drugs had been kept under lock and key.

There has been no judicial guidance since 1949 on what is or is not within the regulations. It cannot be said with any confidence that a locked case lying in the car would not be a breach. It is more likely that the courts would decide that a locker which was part of the car, just as the drug cupboard is part of the house, would be a "receptacle." It is probably wise as a matter of law, as it is of common sense, not to leave dangerous drugs in a car at all.

(1) *Chatham Standard*, May 9th.
(2) *Dhulipala Kameswara Rao* v. *Wyles* [1949] 2 All E.R. 685. *British Medical Journal*, November 12th, 1949, p. 1119.

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Scottish Homes Share Veterinarian's Legacy

Eight English and three Scottish homes for men totally disabled by war service were declared eligible for shares in the £55,477 estate left by an Edinburgh veterinary surgeon when Lord Mackintosh gave judgment in the Court of Session in an action raised to determine claims to shares in the estate. His Lordship continued the case pending a motion for proof.

The veterinary surgeon, Walter Jowett, F.R.C.V.S., 16, Warriston Gardens, died in March, 1945. After making certain provision for his wife he directed his trustees in his will to divide the whole free residue of his estate "equally among the various homes in England and Scotland, if funds permit) for men totally disabled by war service." His wife died in August, 1949, and there was no issue.

Claims were lodged by 14 organisations.

Valid Charitable Bequest

Lord Mackintosh repelled the claim of the Lord Advocate, who maintained that the bequest was void from uncertainty and that it fell to the Crown as *ultimus haeres*. His Lordship held that the bequest was a valid charitable one.

Referring to the construction to be put on the words "if funds permit," Lord Mackintosh said he thought all difficulty could be overcome by following a previous decision and importing into this clause a discretion in the trustees to say whether or not the funds were sufficient to permit the qualified homes in Scotland sharing in the bequest.

His Lordship found that St. David's Home, Castlebar Hill, London; the Star and Garter Home, Richmond Hill, Surrey; the British Limbless Ex-Service Men's Association, Manchester; the Sir Oswald Stoll Foundation, London; the Officers' Association (British Legion), London; the East Lancashire Homes for Disabled Soldiers and Sailors, Manchester; the Lyme Green Settlement for Paraplegics, Macclesfield; and Kytes Settlement for Paraplegics, Watford, Herts, had stated relevant claims to shares in the bequest.

In the event of the trustees exercising their discretion the Scottish homes to be included were the Thistle Foundation, Edinburgh; the Princess Louise Scottish Hospital for Limbless Soldiers and Sailors (Erskine Hospital), Glasgow; and the Scottish National Institution for the War Blinded, Newington House, Edinburgh.

If the Scottish homes were to be admitted, Lord Mackintosh said, he thought that in the case of the Scottish National Institution for the War Blinded their share should be earmarked for the Linburn scheme, as it appeared that Newington House had in recent years become less of a residential home and more of a training centre for war blinded.

Lord Mackintosh repelled the claims of the British Legion Haig Homes and the Scottish Veterans' Garden City Association.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:
Kent.—Field Farm, Egerton, Ashford (Jan. 13th).
Lancs.—Black Lion Farm, Heapy, Chorley (Jan. 13th).
Lincs (*Kesteven*)—Cottage Farm, Dunston, Lincoln (Jan. 17th).
Northants.—Cook's Lane, Wigton, Leicester (Jan. 13th).
Westmorland.—Deansbiggin Farm, Kirkby Lonsdale, Carnforth (Jan. 17th).

Foot-and-Mouth Disease:
Norfolk.—King's Head Hotel, Filby, Gt. Yarmouth; Morley Mill, Morley St. Botolph, Wymondham (Jan. 13th); Old Hall Farm, Forncett St. Mary, Norwich (Jan. 17th).
Suffolk (*E.*).—Beech Tree Farm, Rushmere, Lowestoft (Jan. 13th); School Farm, Westhall, Halesworth (Jan. 16th).
Yorks (*E.R.*).—Binnington Wold Farm, Staxton, Scarborough; 1, Manor Road, Preston, Hull (Jan. 17th).

Fowl Pest:
Lancs.—All at Preston: Nook Farm, Bretherton; Smithy Lane, Much Hoole; Gill Lane, Longton (Jan. 13th); Oakleigh, Liverpool Old Road, Much Hoole (Jan. 14th); Back Lane and Hall Lane, Longton (Jan. 17th).
Also at Warton Hall Farm, Lytham (Jan. 15th).

Swine Fever:
Cambs.—Willow Farm, Haslingfield (Jan. 17th).
Glos.—Aston Road, Chipping Campden (Jan. 17th).
Norfolk.—Downham Farm, Downham, Wymondham (Jan. 17th).
Suffolk (*W.*).—Concrete Products, Hollow Road, Bury St. Edmunds (Jan. 17th).
Warwicks.—The Croft Bungalow, Bilton Lane, Dunchurch, Rugby (Jan. 15th).

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John Peel's Hunting Horn Sold for £600.—The somewhat battered copper hunting horn, fashioned in a single loop (7 inches long), used by the celebrated Cumberland huntsman, John Peel, when hunting his hounds, went to Mr. W. N. Johns-Powell, of Cardiff, after an opening bid of £100, for £600 at Sotheby's on December 17th. Mr. Johns-Powell, it is understood, intends presenting it to his son, a follower of the Glamorgan Hunt.

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Second International Congress of Physiology and Pathology of Animal Reproduction and of Artificial Insemination

The preliminary programme has been issued of the above Congress, to be held in Copenhagen, Denmark, from July 7th to 11th, 1952. Full particulars may be obtained from the Secretary-General, Professor Ed. Sorensen, The Royal Veterinary and Agricultural College, Bülowsvej 13, Copenhagen V, Denmark; in the meantime, it will be of interest to our readers to know that when, on August

7th, 1949, the Executive Committee held a meeting in London in order to discuss place and time for the next Congress, England was suggested as the meeting place and Dr. John Hammond was asked to examine the possibilities of having the next Congress held in London in 1951.

This proved to be impossible and the Executive Committee then proposed Denmark as the seat for the next Congress. Meanwhile the Fifth International Congress of Animal Husbandry was held in Paris in 1949, and at this Congress it was suggested that the meetings of the Sixth International Congress of Animal Husbandry and the Second International Congress of Physiology and Pathology of Animal Reproduction and of Artificial Insemination be held at the same time and place as a large number of people might be interested in participating in both Congresses. The Executive Committee agreed to act on this basis, and after the Danish Ministry of Agriculture had consented to support both Congresses the members of the Standing Committee unanimously agreed to hold the Congress in Copenhagen in July, 1952.

The President of the Congress is Dr. John Hammond, of the University of Cambridge School of Agriculture, and the Vice-President Professor N. Lagerlöf, of the Royal Veterinary College, Stockholm.

The preliminary programme of the main events is as follows:—

SUNDAY, JULY 6TH, 1952

8.0 p.m. Reception by the City of Frederiksberg.

MONDAY, JULY 7TH, 1952

9.0 a.m. Official opening of the Congress by a representative of the Danish Government and by Professor N. Thorkil-Jensen, Principal of the Royal Veterinary and Agricu'tural College. Addresses will then be delivered by the President, John Hammond, and the Secretary-General, Ed. Sorensen.
The scientific meetings will begin immediately after the opening.
Plenary session: The Physiology of Reproduction.
1. The physiology of fertilisation and the early stages of embryonic development.
2. S. A. Asdell, Cornell University, Ithaca, N.Y., U.S.A.: A regional approach to problems of fertility and breeding efficiency in dairy cattle.

3.0 p.m. Sectional sessions.

TUESDAY, JULY 8TH, 1952

9.0 a.m. Plenary session: The Pathology of Reproduction.
1. J. A. Laing, University of Bristol, Veterinary Laboratory, Langford House, Langford, Nr. Bristol, England: Early embryonic mortality.
2. P. Sjollema, Health service for cattle in Friesland, Leeuwarden, Netherlands: *Vibrio foetus* infection in cattle and its importance to fertility.

3.0 p.m. Sectional sessions.
9.0 p.m. Informal dance at the Congress Headquarters.

WEDNESDAY, JULY 9TH, 1952

8.30 a.m. Excursion.
9.0 p.m. Reception at the Town Hall by the City of Copenhagen.

THURSDAY, JULY 10TH, 1952

9.0 a.m. Plenary session: Artificial Insemination
1. James Anderson, Experimental Station, Naivasha, Kenya: Examination of semen and the relationship to fertility.
2. The application of antibiotics to diluters and its importance to fertility.

2.0 p.m. Sectional sessions.

FRIDAY, JULY 11TH, 1952

9.0 a.m. The members are invited to take part in the plenary session of the Sixth International Congress of Animal Husbandry. Subject: Nutrition and Fertility.
2.0 p.m. Reception at the "Bellahoj" Agricultural Show.
4.30 p.m. Closing session.
7.30 p.m. Concluding banquet.

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QUEENSLAND CATTLE THRIVING ON SORGHUM STUBBLE

In a message to his paper on December 9th, the Brisbane Correspondent of *The Times* writes: "The experience of the Queensland British Food Corporation in feeding cattle on sorghum stubble during the drought may bring about an important development in central Queensland.

"Stubble-grazing is of considerable interest to the middle west as a means of nutritive grazing in bad years, bringing stock to prime condition when natural grasses contain only sufficient nutriment to keep the beasts alive. At the corporation's Peak Downs farm there are 1,000 cattle in fine condition, many of them grazing on stubble from a sorghum crop harvested five to seven months ago. Mr. V. H. Wettenhall, the corporation's stock general manager, claimed that these cattle, which came on the stubble two and a half months ago, stood out for the excellence of their condition among all the cattle on the central highlands. He estimated that their average dressed weight would be 750 lb.

"Although some graziers are asking whether prices for fat cattle would warrant the expense of such an undertaking as opposed to orthodox grazing on natural pastures, the corporation's experiment has so impressed private enterprise in the district that farmers are also trying it. They are applying the principle also to sheep, and one farmer, Mr. O. K. Benn, of Capella, said to-day he had been grazing 1,400 sheep on 400 acres of stubble since April; on similar country with only natural grasses, 400 acres would support only 150 sheep."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

A REMARKABLE COW

Sir,—In Australia this summer—or rather winter in those parts—I made the acquaintance of a very remarkable cow.

"Betty" is not one of your pure-bred types, being of Jersey-Dexter-Kerry lineage: she is owned by Mr. W. Easton, of Geraldton, West Australia, who bought her 16 years ago when she had just given birth to her first calf. She has milked continuously throughout those years, although she has had no other calf and in fact has not been mated in the interval. She presents Mrs. Easton (the only one she permits to milk her) regularly with a daily quantity of 6 pints of milk in the summer and 9 pints in the winter. My friend Mr. Gerry Throssell, District Agricultural Adviser, vouches for the authenticity of those facts.

I would not hazard any guess as to how long this venerable animal will continue to supply the Easton family with milk. When Mrs. Easton conducted me to see her where she was browsing in the pasture and I approached her warily with a view to glancing at her teeth, she kicked up her heels and made off in the most sprightly fashion.—Yours faithfully, H. C. Watson, The Dairy Farm, Ice & Cold Storage Co. Ltd., Hong Kong. *November 26th*, 1951.

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THE VETERINARY SURGEON'S TITLE

Sir,—With reference to Mr. Harrow's letter in *The Veterinary Record* of November 3rd, which has just reached me, I say a most emphatic "No!" to any suggestion that we should be dubbed "Doctor" by courtesy, discourtesy or for any other reason. Here, as in South America and the West Indies generally, chiefly because there has always been a preponderance of Canadian and U.S. graduates, veterinarians in common with surgeons, dentists, naturopaths and many unqualified persons are called "Doctor." It is most embarrassing and cheapens the title.

Any suggestion of this kind must surely come from a feeling of inferiority—however much it may be denied. Equally surely this profession must have ceased at this stage to feel inferior to any other.

Surgeons feel like holding a gun at the head of the uninitiated who persist in calling them "Doctor"—and that can hardly come from any feeling of inferiority to the "G.P."!

The universal plea here of U.K. graduates in the surgical, dental and veterinary professions is "Call me Mister!" and long may it so remain.—Yours faithfully, J. F. F. Callear, Veterinary Division, Dept. of Agriculture, Georgetown, British Guiana, South America. *December 11th*, 1951.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

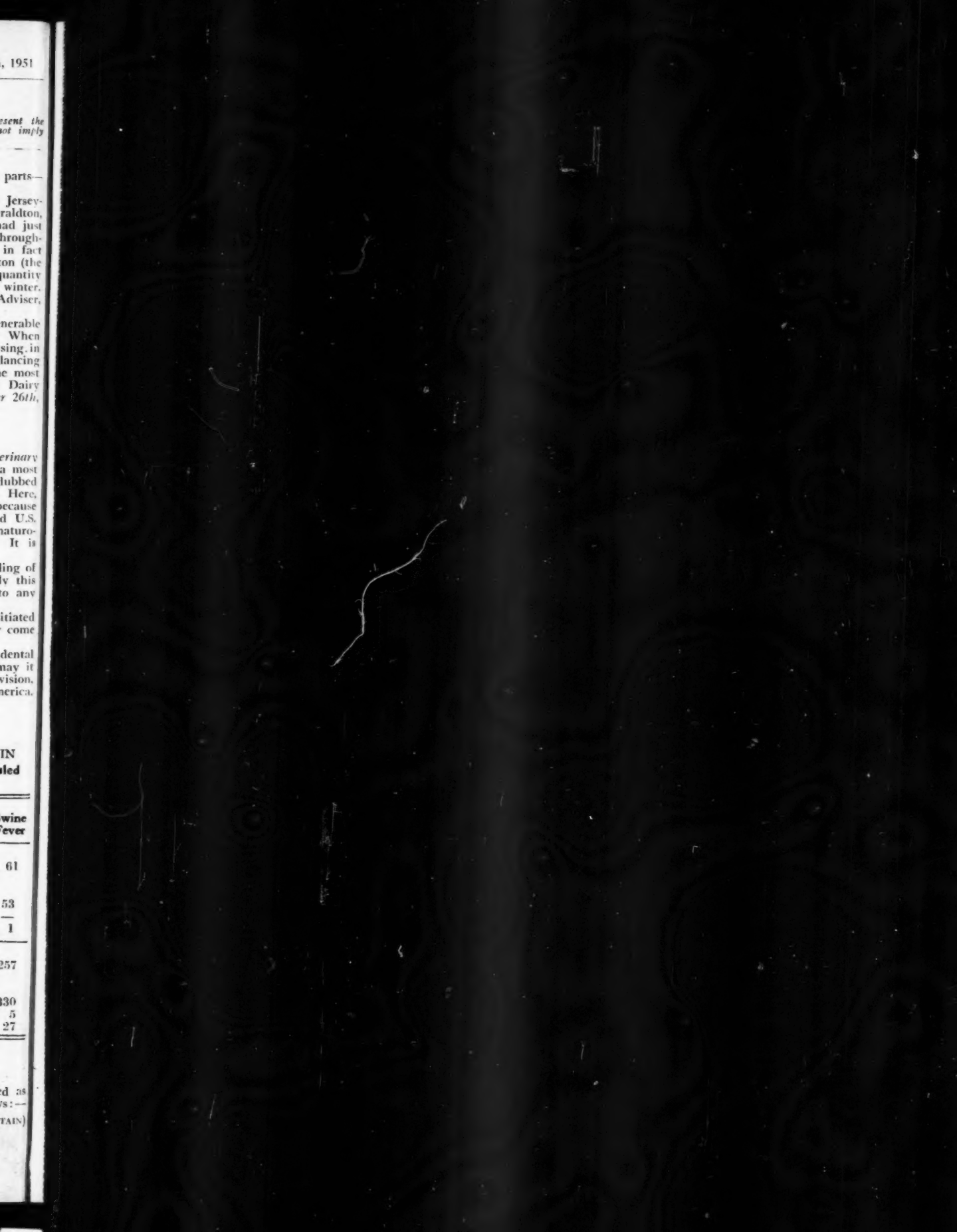
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
Nov. 16th to 30th, 1951	13	37	69	—	2	61
Corresponding period in—						
1950	12	—	9	—	1	53
1949	11	2	17	—	—	—
1948	3	7	1	—	6	1
Jan. 1st to Nov. 30th, 1951	367	70	784	—	8	1,257
Corresponding period in—						
1950	318	20	120	—	24	330
1949	217	15	558	—	34	5
1948	101	11	254	1	60	27

* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at November 30th, 1951, was as follows:—

England	Wales	Scotland	Total (Great Britain)
35,605	20,274	16,942	72,821

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